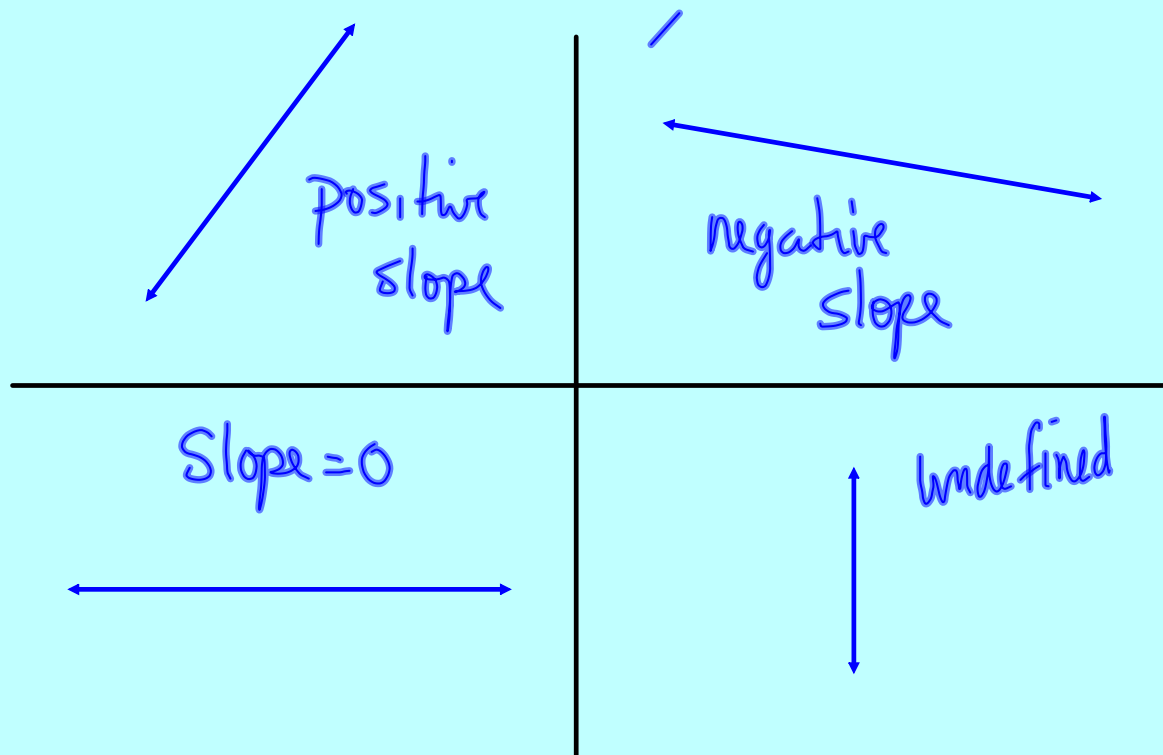


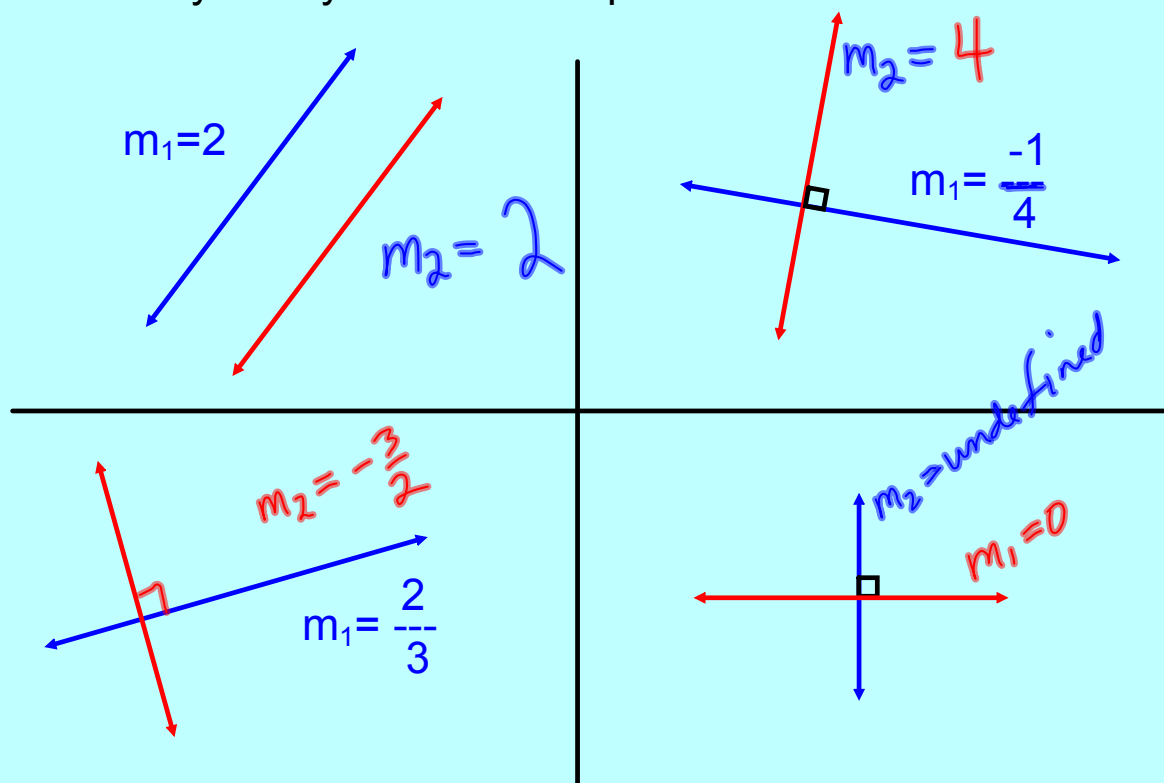
UNIT 2 ANALYTIC GEOMETRY

L1- (Ch2 Getting Started)
Slope & the Equation of a Line

What can you say about the slope of these lines?



What can you say about the slope of the red lines?



Slope & the Equation of a Line

To write the equation of a line $y = m x + b$, we need

- a) slope (m)
- b) y-intercept (b)

- a) to calculate m (slope), we need two points:
(x_1, y_1) and (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} = \frac{\text{Rise}}{\text{Run}}$$

- b) to calculate b (y-intercept), substitute any point on the line back into the equation and solve for b .

NOTE:

Vertical lines are defined by the equation $x = \#$, and have an undefined slope.

Horizontal lines are defined by the equation $y = \#$, and have a slope of $m = 0$.

Ex.1 Determine the equation of the line;

(a) through $(5, 1)$ and $(7, -3)$. $y = mx + b$

Step 1

Calculate Slope

$$\begin{aligned}
 m &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{(-3) - (1)}{(7) - (5)} \\
 &= \frac{-4}{2} \\
 &= -2
 \end{aligned}$$

$$y = -2x + b$$

sub(5,1) to solve b

$$1 = -2(5) + b$$

$$1 = -10 + b$$

$$10 + 1 = b$$

$$b = 11$$

\therefore the equation of the line is
 $y = -2x + 11$

(b) through (2, 6) and parallel to $y = 2x + 3$

Step 1 - sub slope into new equation

$$y = 2x + b$$

Step 2 - use (2, 6) to solve b

$$6 = 2(2) + b$$

$$6 = 4 + b$$

$$b = 2$$

\therefore the equation of the line is $y = 2x + 2$

(c) through (2, 6) and perpendicular to $y = 2x + 3$

$$m_{\perp} = -\frac{1}{2}$$

New equation

$$y = -\frac{1}{2}x + b$$

sub (2, 6) to solve b

$$6 = -\frac{1}{2}(2) + b$$

$$6 = -1 + b$$

$$b = 7$$

\therefore the equation of the line is $y = -\frac{1}{2}x + 7$

(d) through (5,2) with a slope of 0

$$m=0$$

$$y=mx+b$$

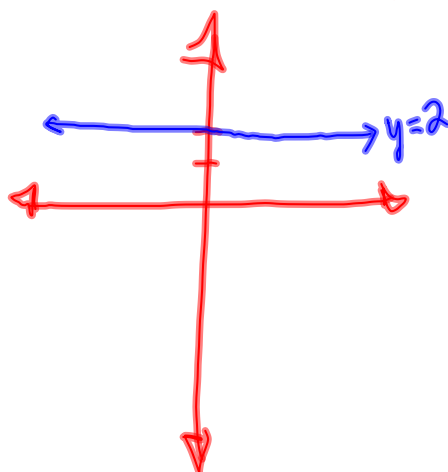
$$y=0x+b$$

$$y=b$$

$$2=b$$

$$b=2$$

\therefore the equation of the line is $y=2$



Horizontal line

(e) through (5,2) with an undefined slope

$$x=5$$

Assigned Work: Ch 2: p.69-70 # 3, 5abc

All vertical lines have the same form $x=\#$

